WE-1

Some discussion/confusion about wave eqn physics

In a nutshell

$$y(x,t) = \sum \sin\frac{n\pi x}{L}\left(a_n \cos\frac{n\pi v t}{L} + b_n \sin\frac{n\pi v t}{L}\right)$$

spatial — temporal

$$v = \sqrt{\frac{T}{\mu}}$$

Q: Why does temporal "wave functn depend on physical parameters but not the spatial wf?" Esp since wave eqn is relativistically covariant (unlike Sch eqn)

Put another way: Separate variables $y(x,t) = f(x)g(t)$

$$\frac{1}{f}\frac{d^2 f}{dx^2} = -k^2 = \frac{1}{v^2}\frac{d^2 g}{dt^2}$$

$f(x) = \cos kx$ $\quad$ $\sin kx$ $\qquad$ $g(t) = \cos vkt$ $\quad$ $\sin vkt$

$$v^2\frac{1}{f}\frac{d^2 f}{dx^2} = -w^2 = \frac{d^2 g}{dt^2}$$

$\cos w/v\, x$ $\quad$ $\sin w/v\, x$ $\qquad$ $\cos wt$ $\quad$ $\sin wt$

Boundary conditions $\quad k = \frac{2\pi n}{L} \qquad \frac{w}{v} = \frac{2\pi n}{L}$

Both lead to $\sin\frac{\pi n x}{L}$.

It must be the BC that break x, t symmetry

WE-2

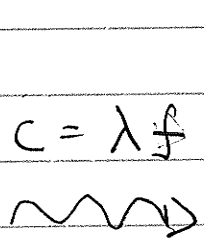
Not just a Math Question:

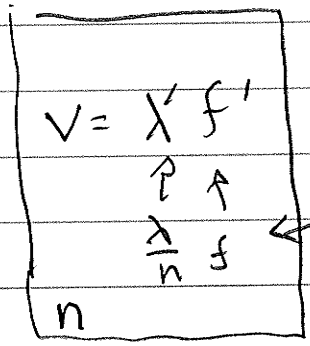
What determines the sound our ear perceives?

Does ear measure k or ω? If k then all strings sound same indep of T/μ.

Similar Q for eyes

$c = \lambda f$





What color do you see?

Q: Is it the changed in medium of index n or not?

Eye is sensitive to f not λ!

Why?